

BATES OF THE AMAZONS.

IN science, perhaps, even more than in literature, a striking disparity often exists between a man's power and his actual performance. The greatest books do not invariably come from the greatest men ; still more does not the greatest fame invariably follow the greatest book of the deepest thinker. A smaller brain is often more famous than a bigger one, and even in a certain sense justly more famous. For while those who know the man himself judge him mainly by his intrinsic power, the world at large judges, and must judge him, by his performance only. And performance depends, not upon the man himself alone, but upon endless accessories—his circumstances, his time, his place, his contemporaries.

Henry Walter Bates had, in my humble judgment, one of the profoundest scientific intellects I have ever known : and it has been my good fortune on the road through life to know many or most of the deepest scientific thinkers of our epoch.

Psychological moments arise now and again in the slow evolution of human thought when a particular advance becomes practically inevitable—when a particular truth trembles on the lips of a hundred speakers, yet trembles unspoken—when a particular theory all but frames itself into words at once in many minds, yet evades every one of them for awhile with persistent elusiveness. At such times as these, one man, more lucky than the rest, at last stands forth, whom chance or circumstance has specially fitted, often in some mere detail of position or accidental surroundings, for lighting upon the great truth which half the world is eagerly expecting. The problem is there already, and is fully recognised ; it is the solution alone that thinkers await ; and when once that solution comes, as by a flash of inspiration, they acclaim it unanimously with great joy as a gain to the species.

The outside world, however, which cares for none of these things, is apt to think that to the solver himself belongs all the credit both of the solution and the problem. Blandly unaware that the barrier in the way ever existed at all until it is called upon to rejoice over its triumphant demolition, the outside world is prone to believe that the man who succeeds in unravelling the knot is also the man who first perceived its existence and its knottiness. In this way mankind at large tends always to personify and individualize every great revolution of the human intellect ; to see in the Protestant Reformation only Luther and Calvin ; in the French *Eclaircissement* only Voltaire and Rousseau ; in the vast political upheaval of the

eighteenth century only Danton and Robespierre ; and in the evolutionary movement of our own day the one commanding figure of Darwin.

Students know well that no view on earth could be more erroneous. It is the wave that makes the crest, not the crest that makes the wave. One man never yet produced a revolution. Long before Charles Darwin published his epoch-making work, conjecture and speculation were rife in England as to the origin of species and the evolution of organic life. Even if such a person as Charles Darwin had never lived at all, we should still have had not only the theory of organic descent with modification (which is older by far than Charles Darwin himself), but also the distinctive theory of natural selection, which was Charles Darwin's own special contribution to the growing body of evolutionary thought, but which was also independently, and almost simultaneously, struck out, as all the world now knows, in the mind of Alfred Russel Wallace. And I say this, not to belittle Darwin, as small souls may imagine, but to honour and magnify him. Where all were searching the key, it was he who first found it. Yet to the others, too, no mean honour is due. They helped more silently. There were Darwinians before Darwin ; there would have been Darwinians still if Darwin had gone to his grave with his secret unuttered. And among these predecessors and contemporaries of our great evolutionist, who were working upward independently to the same general goal, seen dimly through the mist, few were more able, few more learned, none more self-effacing, more modest, more retiring, than "Bates of the Amazons." It is a matter for congratulation, therefore, that Mr. Murray has seen fit to republish in its original unabridged form Bates's one great work, and that Mr. Edward Clodd, Bates's nearest friend and neighbour, should have been induced to prefix to it a memoir, in his usual crisp and clear-cut English, with copious extracts from letters and journals. It is a labour of love admirably performed, and it cannot fail to attract and interest in its hero all serious students of the evolution of evolution.

Bates was above all things a great and lovable soul. He was a man to know, to admire, to look up to. His personality ranked far and away in value above any one of its definite outcomes. But wise men judge a man by what he *is* ; only the second class of intellect judges him by what he has said or done or written. Looked at as pure intellect, I will venture to say that, among the men of his time, Herbert Spencer towers by a head and shoulders above all the other makers of the evolutionary revolution ; he was the philosopher, the psychologist, the logician of the movement. But in practical ability and in organizing power Darwin ran him hard ; though the author of the *Origin of Species* could never pretend

to the same width of view and the same profundity of instinctive insight as the great thinker of the *System of Synthetic Philosophy*. These two stand alone; of the others, their comrades but not their peers, Bates may perhaps be entitled to take the first seat among a noble company in a place of high collateral glory. In some ways, indeed, his mind was greater (because broader) than even Darwin's. He had a more philosophic grasp of things; his interests outside his own special subject were wider; his tastes were higher; his literary culture more catholic. Yet it may well be doubted whether anything of him except *The Naturalist on the Amazons* will ever live; and even that in future ages will doubtless be far more praised than looked at. He will be remembered hereafter only as one of the lesser stars of the evolutionary galaxy; he will be quoted chiefly as the discoverer and formulator of the principle and theory of organic mimicry.

If I were to allow myself a bold comparison, I would say that while Darwin was the Raffaelle of the biological Renaissance, and Spencer its Leonardo, Bates might almost be considered its Andrea del Sarto.

Henry Walter Bates was born at Leicester. The fact itself is not without significance; for Leicester is the most persistently individualist town in England. No one great trade there dominates the place, as hardware dominates Birmingham, cutlery Sheffield, woollen goods Bradford, or cotton Manchester. Many small manufactures run on side by side, with conflicting interests and infinite diversity of method. The consequence is that no single current of feeling or opinion gets the upper hand in the town; the people are radical, but individual in their radicalism; given to a wholesome variety of curious fads—anti-vaccinationist, Unitarian, free-love, or teetotal. They showed this admirable mettle once by asking Mr. Herbert Spencer to be their parliamentary candidate; and when the philosopher refused the incongruous offer, straightway transferring the honour of their suffrages to Mr. Frederic Harrison. They wanted, in fact, a Man to represent them. I think if I were ever seized with an insane desire myself to join the debating club at Westminster, I should like to go as the delegate of Leicester. And I often fancied I detected some tinge of this peculiar local Leicestershire individualism in Bates's charming and many-sided personality.

He was a man of the people—of home-bred culture—the son of “Honest Harry Bates,” a small local hosiery-maker. Unitarian born—and I know no better creed than Unitarianism for a man to come out of—he received but a slender school education, which, as Mr. Clodd aptly and somewhat slyly puts it, did not suffice to dull his desire for knowledge. Apprenticed to another

master of his father's trade, he worked at his business thirteen hours a day, and yet found time for a most multifarious reading ; which conclusively shows the absurdity of the Eight Hours Movement—for surely any honest mechanic can easily find time for mental culture, if he will only expunge the words "pleasure" and "repose" from his simple vocabulary, and ruin his constitution before he is thirty. What more can you want ? This age is too exacting. Before long, if such sybaritic ideas gain ground, the people will be asking for *panem et circenses* ; they will expect decent food, and even begin to demand amusement.

From his cradle, almost, Bates was a beetle-hunter. He hunted by nature. Charnwood Forest lay at his doors, and, strange to say, belonged to an English peer who did not believe God created woods for no other reason than to provide covert for pheasants. But while he hunted beetles, he worked hard too in his leisure time (when-ever that may have been) at historical and general literary reading, gaining in particular that singular acquaintance with "the voluminous page of Gibbon," which distinguished him to the end of his career as the man of letters among biologists. Yet at the same time, while his views were so wide, he laid the foundations of the strictly minute knowledge of his particular branch which so seldom accompanies philosophic breadth and insight. "When I was a young man," he said to me once in a fireside chat, "I wanted to be a naturalist ; but very soon I saw the days of naturalists were past, and that if I wanted to do anything, I must specialise : I must be an entomologist. A little later, I saw the days of entomologists, as such, were numbered, and that if I wanted to do anything I must be a coleopterist. By-and-by, when I got to know more of my subject, I saw no man could understand *all* the coleoptera, and now I'm content to try and find out something about the longicorn beetles." The pronouncement was characteristic ; yet, in spite of all this specialism, nothing could well have been more different than Bates from the ordinary type of narrow specialist.

Among his Leicester friends was one Alfred Russel Wallace, the English master at the Collegiate School. Wallace was a botanist ; but Bates soon infused him with his own love of insects. The two young men were ardently interested in the question of the origin of species, then just brought to the front once more in its Lamarckian guise by the recent publication of the *Vestiges of Creation*. Their letters to one another at this time show them to have been seething to the brim with that curious ferment of opinion which so generally preceded the Darwinian discovery. Darwin himself had then recently returned from the voyage in the *Beagle*, and his *Journal* deeply affected the two young entomologists. They discussed it in their letters ; and a single phrase from one of Wallace's suffices to

dispel the crude idea so generally current that Darwin invented the problem he solved. "I begin to feel dissatisfied," Wallace wrote to his friend, "with a mere local collection. I should like to take some one family to study thoroughly, *principally with a view to the theory of the origin of species.*" These words I have italicised were written and despatched twelve years before the publication of Darwin's work under that famous title.

At last, in '48, that year of upheaval, the desire of the two biological enthusiasts to see for themselves the wonders of the world grew quite irresistible; and clubbing together what scanty money they could raise by hook or by crook, they took passage in a crazy old ship to Pará, with the object of studying the nature of life in its equatorial development. Their choice was a happy one. The tropics, one must never forget, are biological headquarters. Our starved little northern fauna and flora, the mere leavings of the vast ice-sheet that once spread across our zone in the glacial epoch, show us a world depopulated and deprived of all its largest, strongest, and fiercest creatures; a world dwarfed or impoverished in its component elements, and immensely differing in ten thousand ways from that luxuriant and tangled hothouse of nature where the first problems of life were practically worked out by survival of the fittest. It is a chilled winter garden. But the tropics still preserve for us in their teeming jungles something like the rich and varied conditions of the great pre-glacial fauna and flora. No leading biologist has done fruitful work in our own time who has not seen and drunk in the full spirit of the tropics. What the voyage in the *Beagle* was to Darwin, what the travels in South America were to Humboldt, that the years of exploration in the Amazons valley were to Bates and Wallace.

They had prepared themselves well for their work beforehand by a most conscientious study of tropical biology as far as they could do it in the museums of London and the orchid-houses of Chatsworth; and they knew precisely what problems they went to investigate; so it is little wonder they arrived so soon at such valuable conclusions. The history of their trip, so far as the world will ever know it in all probability, is contained in brief in that delightful book, *The Naturalist on the Amazons*, the best narrative of travel, by common consent, ever written in any language. But in that charming work Bates's native modesty made him omit all record of the positively heroic conditions under which he and his companion performed their great task for the benefit of science. And, indeed, unless one heard it from the lips of the chief actor, so dramatic a tale might well have seemed incredible. I was privileged to be present one evening in a drawing-room in North London when Bates broke his wonted reserve in a rare fit of communicativeness, and

poured out to a small and sympathetic company the whole story of his hardships. Genial Paul Du Chaillu was there, fresh back from Norway ; and the author of *Erechon*, that past-master of irony ; and half a dozen more, not unknown to fame, interested listeners every man of them. The tongue of the old man eloquent was loosed that night ; and with marvellous pathos and child-like simplicity he told us in his pure and exquisite English a tale of single-hearted devotion and strange labour for the truth such as no narrative of religious martyrdom could possibly equal. He had the finest forehead I ever beheld upon a human face ; and as he talked and looked we all listened, open-mouthed, as we never listened in our lives to any fiction of the novelist. It was a night to remember ; and many of us said the same thing as we rose to go, "Oh, if we had only had a phonograph to take that all down—accent, intonation, and everything—exactly as he spoke it ! " But since our host of that evening, who writes the *Memoir*, has thought fit to suppress it, at least during the lifetime of some who might feel their sense of dignity falsely hurt by it, I suppose I must follow his good example ; the more so as I neglected to take any notes at the time, and would therefore have to trust for facts and details to that very fallacious informant, memory. Yet this much, at least, I will say ; Bates told us with hushed breath how on that expedition he had at times almost starved to death ; how he had worked with slaves like a slave for his daily rations of coarse food ; how he had faced perils more appalling than death ; and how he had risked, and sometimes lost, everything he possessed on earth with a devotion that brought tears into the eyes of grown men who heard him.

Eleven years of his life he spent in the tropics. At the end of that time he returned to England with £800 as his total savings from the sale of his collections. Such are the prizes which science holds out to her ardent votaries, that in exchange for broken health and a diet of tapioca soaked in coffee, she secured for Bates an annual wage of £72. 14s. 6½d. And yet there are people who consider it strange that men don't devote their lives to science for nothing, and consent to starve for the honour and glory of it !

As soon as the traveller arrived in England he began arranging his collections, and employing them as materials for theoretic reconstruction. One passage from *The Naturalist on the Amazons*, to which Mr. Clodd calls special attention, has always seemed to me among the most philosophical and pregnant in the whole literature of evolution. It refers to the markings on the wings of butterflies.

"I paid especial attention to them," he says, "having found that this tribe was better adapted than almost any other group of animals or plants to furnish facts in illustration of the modifications which all species undergo

in nature, under changed local conditions. This accidental superiority is owing partly to the simplicity and distinctness of the specific characters of the insects, and partly to the facility with which very copious series of specimens can be collected and placed side by side for comparison. The distinctness of the specific characters is due probably to the fact that all the superficial signs of change in the organisation are exaggerated, and made unusually plain by affecting the framework, shape, and colour of the wings, which, as many anatomists believe, are magnified extensions of the skin around the breathing orifices of the thorax of the insects. These expansions are clothed with minute feathers or scales, coloured in regular patterns, which vary in accordance with the slightest change in the conditions to which the species are exposed. It may be said, therefore, that on these expanded membranes, Nature writes, as on a tablet, the story of the modifications of species, so truly do all the changes of the organisation register themselves thereon. Moreover, the same colour-patterns of the wings generally show, with great regularity, the degrees of blood-relationship of the species. As the laws of nature must be the same for all beings, the conclusions furnished by this group of insects must be applicable to the whole organic world; therefore, the study of butterflies—creatures selected as the types of airiness and frivolity—instead of being despised, will some day be valued as one of the most important branches of biological science."

Bates had come back to England in the nick of time. The moment *The Origin of Species* appeared he gave in his warm adhesion to the new theory. As Darwin himself said, he did not belong to "the mob of naturalists without souls." For months after the publication of Darwin's great work, indeed, Bates began his papers on the *Insect Fauna of the Azores Valley* in the *Transactions of the Entomological Society*. They were frankly evolutionary. A year later he read before the Linnaean his famous paper on *Mimicry*, in which he explained on Darwinian principles the existence of those curious mimetic resemblances between animals of widely different structure, which had so long puzzled, and sometimes even misled, biologists. Mr. Clodd does well in quoting largely from this celebrated paper, which, to say the truth, has been oftener praised than read, being buried in the *Transactions* of a voluminous society, and never, so far as I know, reprinted; and I will venture to imitate him by transferring a few of the more striking passages to these pages.

"Some of the imitations by insects of inanimate and living objects are very singular, and may be mentioned in this place. Many caterpillars of moths, but sometimes the cases only which are manufactured and inhabited by the caterpillars, have a most deceptive likeness to dry twigs and other objects. Moths themselves very frequently resemble the bark on which they are found, or have wings coloured and veined like the fallen leaves on which they lie motionless. The accidental general resemblance between the shape of moths' wings and leaves here gives Nature the groundwork for much mimetic analogy. It has been pointed out by Hössler that the buff-tip moth, when at rest, is intended to represent a broken piece of lichen-covered branch—the coloured tips of these wings, when they are closed, resembling a section of the wood. Other moths are deceptively like the excrement of birds on leaves. I met with a species of phytophagous beetle (*chlamys pilula*) on the Amazons, which was indistinguishable by the eye from the dung of caterpillars on foliage. These two latter cases of imitation should be carefully considered by those who would

be inclined to think that the object of mimetic analogies in nature was simply variety, beauty, or ornament: nevertheless these are certainly attendants on the phenomena; some South American *Cassidae* resemble glittering drops of dew on the tips of leaves, owing to their burnished pearly gold colour. Some species of Longicorn Coleoptera have precisely the colour and sculpture of the bark of the particular species of tree on which each is found. It is remarkable that other species of the same small group of *Longicornes* (*phaeolocera buquetii*, *cyclopeplus batesii*) counterfeit, not inanimate objects, like their near kindred just cited, but other insects, in the same way as the *Leptalides* do the *Heliconidae*.

"Amongst the living objects mimicked by insects are the predacious species from which it is the interest of the mimickers to be concealed. Thus, the species of *Scaphura* (a genus of crickets) in South America resemble in a wonderful manner different sand wasps of large size, which are constantly on the search for crickets to provision their nests with. Another pretty cricket, which I observed, was a good imitation of a tiger beetle, and was always found on trees frequented by the beetles (*odontocheilæ*). There are endless instances of predacious insects being disguised by having similar shapes and colours to those of their prey; many spiders are thus endowed; but some hunting spiders mimic flower-buds, and station themselves motionless in the axils of leaves and other parts of plants to wait for their victims.

"The most extraordinary instance of imitation I ever met with was that of a very large caterpillar, which stretched itself from amidst the foliage of a tree which I was one day examining, and startled me by its resemblance to a small snake. The first three segments behind the head were dilatable at the will of the insect, and had on each side a large black pupillated spot, which resembled the eye of the reptile; it was a poisonous or viperine species mimicked, and not an innocuous or colubrine snake; this was proved by the imitation of keeled scales on the crown, which was produced by the recumbent feet, as the caterpillar threw itself backwards. The Rev. Joseph Greene, to whom I gave a description, supposes the insect to have belonged to the family *Netodontidae*, many of which have the habit of thus bending themselves. I carried off the caterpillar and alarmed every one in the village where I was then living to whom I showed it. It unfortunately died before reaching the adult state.

"A similar series of mimetic analogies occurs in the Old World, between the Asiatic and African *Danaidae*, or representatives of the *Heliconidae*, and species of other families of butterflies and moths. No instance is known in these families of a tropical species of one hemisphere counterfeiting a form belonging to the other. A most remarkable case of mimicry has been recorded by Mr. Trimen in a *Papilio* of South Africa (*P. Cenea*), whose male wears to deception the livery of one species of *Danais*, whilst the female resembles a quite different one. Mimetic analogies, however, are not confined to the Lepidoptera; most orders of insects supply them; but they are displayed only by certain families. Many instances are known where parasitic bees and two-winged flies mimic in dress various industrious or nest-building bees, at whose expense they live, in the manner of the cuckoo. I found on the banks of the Amazons many of these cuckoo bees and flies, which all wore the livery of working bees peculiar to the country."

After quoting many other instances of such mimetic resemblances, Bates proceeds to set forth his own explanation of the facts. And here, what he did, as Darwin justly said, was to give "the requisite touch of genius, and hit on the final cause of all this mimicry."

"The explanation," says Bates, "seems to be quite clear on the theory of natural selection, as recently expounded by Mr. Darwin in the *Origin of Species*. The local varieties or races cannot be supposed to have been formed

by the direct action of physical conditions on the individuals because in limited districts, where these conditions are the same, the most widely contrasted varieties are found existing together, and it is inexplicable how they could have produced the nice adaptations which these diverse varieties exhibit. Neither can these adapted races, as before remarked, have originated in one generation by *sports*, or a single act of variation in each case. It is clear, therefore, that some other active principle must be here at work to draw out, as it were, steadily in certain directions, the suitable variations which arise, generation after generation, until forms have resulted which, like our races of *Leptalis Theonoë*, are considerably different from their parent as well as their sister forms.

" This principle can be no other than natural selection, the selecting agents being insectivorous animals, which gradually destroy those sports or varieties that are not sufficiently like *Ithomiæ* to deceive them. . . . Such, I conceive, is the only way in which the origin of mimetic species can be explained. I believe the case offers a most beautiful proof of the truth of the theory of natural selection. It also shows that a new adaptation, or the formation of a new species, is not effected by great and sudden change, but by numerous small steps of natural variation and selection."

To quote Mr. Clodd's admirable summing-up of the argument :—

" Two questions suggest themselves. 1. Why are the *Heliconidæ*, which by their brilliant colouring attract the eye of insectivorous birds, and by their slowness on the wing are easily seized, mimicked more than other families of butterflies ? and, 2. Why are insects so much more subjects of mimicry than other animals ?

" Both questions are answered by Bates. As there is nothing apparent in the structure or habits of the *Heliconidæ* which could render them safe from persecution by the numerous insectivorous animals which are ever on the watch in the same parts of the forest which they inhabit, ' it is probable that they are unpalatable to insect enemies. Some of them have exsertile glands near the arms, which are protruded when the insects are roughly handled ; it is well known that similar organs in other families secrete fetid liquids or gases, and serve as a protection to the species. I never saw the flocks of slow-flying *Heliconidæ* in the woods persecuted by birds or dragon-flies, to which they would have been an easy prey ; nor, when at rest on leaves, did they appear to be molested by lizards or the predacious flies of the family *Asilidæ*, which were very often seen pouncing on butterflies of other families. If they owe their flourishing existence to this cause, it would be intelligible why the *Leptalidæ*, whose scanty number of individuals reveals a less protected condition, should be disguised in their dress, and thus share their immunity. '

This theory of mimicry forms Bates's principal contribution to the philosophy of evolution. It was eagerly accepted by Darwin, as were also his views on the non-extension of the glacial epoch to the equatorial regions. The correspondence on these and kindred subjects between Darwin, Sir Joseph Hooker, and Bates, published in the Memoir by Mr. Clodd, is full of illustrative scientific interest ; but " for the benefit of the ladies and the country members " (as our ancestors used to say in the happy days before Girton and University Extension), I prefer to quote a few notes from the journal of this period, which show Bates rather in the more popular character of a keen observer of men and manners. Here is a charming word-picture of Sir Charles Lyell :—

"Sunday, November 29th, 1863.—This afternoon, when walking in the Zoological Gardens with little Alice and the maid, Sir Charles Lyell accosted me near the seal pond, and we walked about together for an hour or so. He was wriggling about in his usual way, with spy-glass raised by fits and starts to the eye, and began ; 'Mr. Wallace, I believe—ah—' 'My name's Bates.' 'Oh, I beg pardon, I always confound you two.' (His memory must be very bad, for we have often met, and I was once his guest at the Geological Club dinner, Clunn's Hotel, Covent Garden.) 'Ah—did you see the new porpoise the other day?' 'No; I did not happen to be in the gardens, and it lived but a very short time.' He then passed on to something else; asked whether I was a relation of Mr. Spence Bate, who had just written to him about the discovery of 'Kjökkenmöddings,' at Swansea, and so forth.

"We then began talking about my book of travels, and I told him I had just received a request from Mr. Murray to prepare a second abridged and popular edition. It was a capital opportunity to get good advice about second editions and abridgments, so I asked Sir Charles what he would recommend me to do.

"'Well now, in the first place,' he said, 'you had better follow the counsels of Murray. Publishers, you know, are always better judges on these matters than authors. I'll tell you what once happened to me, through acting contrary to publisher's advice. The transaction was with old Murray, not the present one. It was when we were bringing out the first edition of my *Principles*. We had come to the third volume, and Murray said, "Now we shall print several hundred copies less of this than of the preceding volumes." I was very much surprised at this. "Why! how! deprive purchasers from the commencement of the chance of completing their copies? No, I can't consent to that." Nevertheless, Murray was firm; to do otherwise, he said, would entail certain loss. 'Well, I agreed to take the risk on my own shoulders, and the consequence was I burnt my fingers severely. Precisely the number of copies which Murray had recommended me to print was sold. The rest were left on the shelves, curtailing severely my gains on the whole week. But when a second edition came out, including all three volumes, it sold by thousands. I was a youngster then, and the loss of money was of more consequence to me than it would be now.'

"He asked me how many copies I had printed of the first edition. I told him 1,250. This question seemed to be put for the purpose of secretly comparing my literary success with his own. And the result seemed to be satisfactory, for he became more frank than ever, and began to praise my book :

"'I find it exceedingly interesting, and I hope you will not abridge any of the natural history parts, which, to me, seem the most important. Do you know Sir Charles Bunbury?' I told him I had been introduced to him, but I forgot when and where. 'Well, he likes your book amazingly, and is very full of it. What striking account you give of the land-slips. It is very interesting to us geologists, and—turning round and speaking very confidentially—' your description is remarkably well done.'"

"Sir Charles Lyell has the appearance of a fidgety man not well at ease with himself. He is very greedy of fame, and proud of his aristocratic friends and acquaintances. He does not seem to be a very ready man; his learning does not appear to be at his fingers' ends; so that when a subject is suddenly presented to him he has difficulty in collecting his scattered thoughts and bringing forth what he knows upon it. But then he is getting an old man now. Mr. Davison told me that he was a very hesitating writer, and re-wrote every sentence three or four times on the average, as Mr. Davison confessed to me was his own case. But, like a well-bred gentleman, Sir Charles can become very sociable, and evidently likes a good dinner with brilliant conversation; Darwin says he likes to hear himself talk. At the Geological Club dinner when I sat at his left fronting Sir Roderick Murchison and Bishop

Colenso, he made me laugh by retailing a very good thing. The conversation ran on the comparative merits of the scientific hypothesis of the origin of man and the Biblical one: 'Why,' says he, 'the question resolves itself into few words: Is man modified mud or modified monkey?' But he gave it not as his own."

This is an interesting study of differences in men, for Bates was really much the bigger of the two. But Lyell was a man of science who came at the right moment, and did a piece of work just then needed; besides which he had wealth, position, connections; while Bates was a nobody, and had only genius. As a consequence, Lyell's fame is as much above his true intellectual place as Bates's is below it.

Bates's later days were spent as Secretary to the Geographical Society, and few indeed were the younger travellers who did not owe a debt of gratitude to the explorer of the Amazons. Always unobtrusive, he was content with having done good work in life, and rarely expected either praise or recognition. His greatest biological study is buried in the pages of a learned society's *Transactions*; his life itself was buried in the dull work of his office. Yet he lived till the last keen, active, eager, taking a vivid interest in the new problems raised by Romanes and Weismann, against the latter of whom he was once well-nigh minded to deliver his soul in a formal answer. His conversation was charming. As Mr. Clodd well puts it, there was in him "no trace of mental ossification." He retained to the end his plasticity and receptivity. His sentences were perfect, clear-cut, pure English, so that, taken down (alas, that they were not taken down!), not a word need have been altered or transposed. Of his tolerant gentleness I don't think anything could give those who knew him a better idea than the little episode of his correspondence with Mr. P. H. Gosse, who, besides being a distinguished naturalist, was also a member of the exclusive and peculiarly bigoted sect of Plymouth Brethren. Gosse wrote to Bates on one occasion to send the great naturalist a copy of his *Actinologia*, and improved the opportunity in a somewhat characteristic fashion as follows:—

"SANDHURST, TORQUAY, February 13th, 1860.

"**MY DEAR SIR,**

"Will you allow me the pleasure of asking your kind acceptance of the accompanying copy of my *Actinologia*? I have read your numerous letters from Brazil published in the *Zoologist* with great interest, partly, doubtless, because I know a little of tropical collecting; and I have mentally followed you to and fro in the scenes and among the lovely insects, which you have so graphically described, with ever increasing sympathy. From one or two expressions dropped here and there in your letters, I have formed a suspicion, moreover, that you are one of those who love the Lord Jesus, and, if so, this would be an additional and far stronger bond of sympathy between us. For there is no union so strong as that between the 'holy brotherhood, partakers of the heavenly calling,' who by grace have been drawn to believe in Jesus.

"Whether I am mistaken in this conclusion I do not know; but, at all events, I beg you to accept the volume as a token of my regard, and believe me your very sincere well-wisher in every sense,

"P. H. GOSSE.

"H. W. BATES, Esq.

"Are you likely to go out again?"

Many men who thought as freely and boldly on religious subjects as Bates would have been tempted to treat such obtrusive sectarianism with an undertone of polite but evident chilliness. No man has a right, indeed, thus to thrust upon others his own private convictions about matters of the inmost personal interest. It is an impertinence of the emotions which many of us would feel inclined to resist with courteous dissent. Bates, however, kept a draft of his reply, and here it is:—

"MY DEAR SIR,

"Accept my best thanks for the beautiful present you have made me, and the warm welcome which you make me on my return to England. You ask me whether I am likely to go out again. I have no intention at present of doing so. Eleven years of tropical residence and travel, devoted to one pursuit, is a sufficient portion of life to be so spent.

"I have amassed an extensive private collection, and intend to devote at least some years to the study of the species, with a view to publishing a *Montfauna* of the Amazon Valley.

"With regard to the other topic mentioned in your very kind letter, I must assure you that I think I have pursued, and still do pursue, the investigation of the wonderful and beautiful creatures that people the earth with a spirit of humility, admiration, and reverence. There will be differences of opinion between us, I have no doubt, on mere matters of undemonstrable dogmatic theology, but in the more essential points of true religious feeling and spirit, I hope in anything I may hereafter write and publish, to continue and increase the good opinion you appear to have of me.

"H. W. B."

Could anything better show the gentle susceptibility and generous sympathy of the man's nature?

But I must refrain from picking out any more of the plums from Mr. Clodd's delightful pages. I will content myself with merely recommending readers to look for themselves into a charming memoir of a charming, a singular, and a beautiful personality.

GRANT ALLEN.